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ABSTRACT

The Commonwealth Computer-Assisted Instruction Consortium's ninth grade algebra and mathematics development programs continued to progress along several lines during the period ending November 15, 1969. Responsibility was assigned for authoring the remaining chapters of the programs and criterion tests were developed for on-line administration at the end of each chapter. Procedures for providing corrections and revisions were established, involving both ad hoc contacts between teachers and consortium staff and regular weekly printouts sent to project headquarters. Training and evaluation conferences for the systems managers and the teachers at the two participating high schools were held and efforts were made to assess the relationships between student attitudes toward algebra and math and time spent on-line, amount of material covered, and mathematics performance. Finally, the IBM 1500 System, 1510 instructional stations, and 1518 image projectors were installed and made operational. (PB)

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Commonwealth CAI Consortium
ESEA Title III Project #5523
Technical Report, November 15, 1969

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Course Development

The Algebra I and General Mathematics courses under development are directed to a ninth grade student population. The essential innovative feature of these courses is a tutorial instruction program under computer control. This "on-line" program is supplemented by a variety of more conventional individualized learning experiences.

The students will receive basic instruction in mathematical concepts from the computer-assisted instruction program. A record of the student's interaction with the CAI program will be stored in the computer. These performance data will serve to direct the flow of the "on-line" instruction. The student whose performance indicates rapid acquisition of the mathematical concepts will by-pass the detailed instruction required to bring a less able student to criterion.

In addition to controlling the flow of the CAI program, the student performance data will enable the CAI classroom teacher to assign to the students appropriate "off-line" instructional materials to meet their individual needs. These materials will include filmstrips, mathematical games, programed instruction materials, printed materials, and manipulative materials.

Professor Thomas Kieren, mathematics educator in the College of Education, has assumed the responsibility of authoring the unwritten chapters in algebra and general mathematics. He is assisted by Consortium staff members who have had experience teaching high school mathematics.

Tests are being developed for on-line administration at the end of each chapter of the algebra and general mathematics courses. The test items parallel the format and content of questions presented in the instructional portion of

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the program and the on-line quizzes. The chapter tests should be viewed as criterion tests for the chapters. If a student's performance is unsatisfactory, the areas of difficulty may be identified by the teacher and remedial activities prescribed.

Course Correction and Revision

A procedure for providing feedback regarding corrections and revisions has been established with the Consortium personnel in Lincoln and Schenley schools. Errors in the on-line program are noted on a form by the teachers or systems managers in the schools. The forms are mailed to a member of the Penn State Consortium staff who is responsible for making the necessary corrections in the computer program at Penn State. Up-dated versions of the computer program are placed on magnetic tape and sent to the Lincoln and Schenley schools periodically.

Urgent problems in the computer program are reported by telephone to Penn State. The necessary corrections to the program are determined and given to the systems managers at Lincoln and Schenley by telephone.

Suggested major revisions to the instructional content are filed for future action by mathematics educators.

When a student signs off at the student terminal, a message is printed out at a typewriter proctoring the student terminals. This message contains data on the student's performance on the course material. A provision is made in the program for the teacher to enter comments about student performance or course irregularities. The comments are also printed out at the typewriter terminal.

Copies of the typewriter printout are sent to Penn State from Lincoln and Schenley schools each week. The printouts are scanned for irregularities in student performance as indicated by the proctor messages and for teacher comments. When a proctor message indicates that students are having difficulty with a particular section of course material, appropriate changes are made to the program.

Data from Student Performance Records were compiled for eighteen students at Schenley and twenty-four students at Lincoln. An evaluation of these data served to identify questions with a high number of response attempts.

This indicates needed revision to the wording of the questions or changes to the feedback for incorrect responses.

Training

To facilitate exchange of information an informal conference was held at University Park for the systems manager at Lincoln High School (Mr. Bernie Slotnick) and the manager at Schenley High School (Mr. Stanley Mechlin). The conference was a working session focusing on experience gained in the first two months of operation, on information about the CAI system, and on information about the courses in use at the two schools. Supporting the conference were Mr. Robert Igo, director of curriculum development, and Mr. Fred Chase, CAI Laboratory systems manager. As a result of the conference, the procedure for making course corrections was clarified, system documentation deficiencies were corrected, and detail questions about the structure and use of special course routines were answered. Numerous procedural and organizational problems were addressed.

Evaluation

A conference of the Consortium CAI classroom teachers was planned for October 17, 1969, at University Park. The purpose of the conference was to provide the teachers with an opportunity to identify common problems encountered in a CAI classroom, to provide feedback from the teachers for the Penn State Consortium personnel on the progress of the operation, and to establish priorities for developing new material based on the experience of the teachers with the program. In order to focus on certain aspects of its operational experiences, each teacher was asked to be prepared to discuss a topic.

Miss Catherine Folger and Mr. Roland Lazzaro from Schenley High School attended the conference. Dr. Thomas Kieren and Mr. Robert Igo represented

Penn State. The teachers from Lincoln High School were unable to attend. The reports by Miss Folger and Mr. Lazzaro provided a valuable insight into the operations of the Consortium CAI program at Schenley.

It was the concensus of the conference attendees not to attempt to identify general problems in the algebra and general mathematics courses or to establish priorities for developing new material without the participation of the teachers from Lincoln. In an attempt to acquire the information to accomplish the objectives proposed for the conference, a list of questions designed to evaluate CAI classroom procedures was suggested by the discussion with the teachers attending the conference. The list of questions was sent to the teachers at Lincoln and Schenley on October 28, 1969. Miss Folger and Mr. Lazzaro have returned their responses to the list of questions to Penn State. Responses to the list of questions have not been received from Lincoln.

Teachers at both Lincoln and Schenley have taken informal surveys of student attitude of the CAI classroom experience. The surveys consisted of written comments by the students. The results of the surveys indicate a positive attitude toward the on-line program in particular and a preference for the CAI classroom environment in general.

A mathematics attitude scale, developed by Dr. William Rabinowitz, Professor and Head, Department of Educational Psychology, The Pennsylvania State University, was administered to the students at Schenley High School at the beginning of the school year. A study was made to determine if there was any significant relationship between time on line, total performance, amount of material covered, and scores on the mathematics attitude scale.

Correlation between attitude scores and time in the algebra course show very little relationship on any significant value. Correlation between attitude and performance scores showed no significance. There was no significant relationship between attitude and amount of material covered. Time with amount of material also showed no significant relationship.

For the general mathematics students, a slight significance was indicated between attitude and time scores and attitude and performance. There was no

correlation between attitude and amount of material covered. Time with amount of material, time with performance, and performance with amount of material showed a definite correlation in this group of students.

A formal opinion survey on student's attitude toward CAI is being developed. It has been proposed to administer this survey on-line once a grading period.

Facilities

An IBM 1500 system with eight 1510 instructional stations with typewriter keyboards and lightpens and eight 1518 image projectors are operating in Lincoln and Schenley High Schools. The Consortium staff continued to use approximately fifty per cent of Penn State's CAI system during the present report period.

Schedule

Target dates for the current funding period:

November 15, 1969, to February 28, 1970:	Complete Chapters 5 through 8 in algebra and Chapters 10 and 11 in general mathematics.
November 15, 1969, to February 28, 1970:	Continue formal CAI mathematics education program at two high schools -- Lincoln High School, Philadelphia, and Schenley High School, Pittsburgh.